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[Claim(s)]
[Claim 1]
It is the division method of a semiconductor wafer of dividing into the semiconductor chip for each circuit of every the semiconductor wafer with which the circuit was formed in the field divided by the street,
The support plate unification process at which the pressure sensitive adhesive sheet with which adhesive power declines is made to intervene, the surface of a semiconductor wafer is stuck on a support plate, and the back of this semiconductor wafer is exposed by stimulus,
The polish process which grinds the back of the semiconductor wafer which was united with this support plate,
The dicing process which carries out dicing of the semiconductor wafer which this polish process was completed and was united with this support plate where it turned the back upwards and it is held, and divides it into a semiconductor chip,
The partition process which this stimulus is given to this pressure sensitive adhesive sheet, and adhesive power is reduced, and removes this semiconductor chip from this support plate
The manufacture method of the semiconductor chip ** constituted.
[Claim 2]
The manufacture method of a semiconductor chip given in the 1st clause of a claim by which the generation-of-gas agent which generates gas by stimulus is contained in a pressure sensitive adhesive sheet.
[Claim 3]
It is the manufacture method of a semiconductor chip given in the 2nd clause of a claim in which stimuli are ultraviolet rays and a generation-of-gas agent generates gas by these ultraviolet rays.
[Claim 4]

The manufacture method of a semiconductor chip given in the 3rd clause of a claim which irradiates ultraviolet rays in a partition process only at a semiconductor chip to make it separate from a support plate.

[Claim 5]

A pressure sensitive adhesive sheet is the manufacture method of a semiconductor chip given in the 3rd clause of a claim which is made to contain the generation-of-gas agent which becomes at least one or more kinds of resin chosen from acrylic, an OREFIN system, and the Pori Karbo Nate system from an azo compound, and is constituted.

[Claim 6]

A support plate is the manufacture method of a semiconductor chip given in either the 1st clause of a claim constituted by the transparent or translucent quality of the material, or the 5th clause.

[Claim 7]

It is the manufacture method of a semiconductor chip given in the 6th clause of a claim the thickness of whose a support plate is constituted by glass and is 0.5mm to 2.5mm.

[Claim 8]

The manufacture method of a semiconductor chip given in the 1st clause of a claim by which the alignment mark which shows the position of a street is formed in the perimeter part of a support plate.

[Detailed Description of the Invention]

Technical field

This invention relates to the manufacture method of the semiconductor chip for preventing that a semiconductor wafer and a semiconductor chip carry out breakage, modification, etc. in the process which carries out dicing and which is used as a semiconductor chip, after grinding the back of a semiconductor wafer.

Background art

Semiconductor chips, such as IC and LSI, are formed by carrying out dicing of the street S in all directions, after grinding the back of semiconductor wafer W where the circuit was formed in the field C of a large number divided by Street S and considering it as desired thickness, as shown in Fig. 14.

When grinding the back, in order to protect the circuit formed in the surface since the surface side was held by polish equipment, masking tape is usually stuck on the surface. moreover, when being thinly ground so that the thickness of semiconductor wafer W may be set to 100 micrometers or less in order to attain miniaturization of various electric devices, and thin

shape-ization Since semiconductor wafer W after polish becomes flexible like paper and handling becomes difficult, in order to make subsequent conveyance etc. easy, as conveyance etc. becomes easy, the device is made by sticking and supporting the surface of semiconductor wafer W to a rigid high support plate.

However, in order to carry out dicing of the semiconductor wafer which became thin using dicing equipment by polish on the back, to exfoliate from a support plate and to have to stick a semiconductor wafer on a dicing tape again, there is a possibility of damaging a semiconductor wafer, in the case of exfoliation or attachment. About especially the semiconductor wafer with which thickness was formed very thinly with 100 micrometers or less and 50 micrometers or less of polish, it is very difficult to stick again, without making it damaged.

Moreover, [where the surface of a semiconductor wafer is stuck on a maintenance tape in invention indicated by Japanese JP,H10-284449,A, for example, in order to perform polish and dicing, the stick substitute at the time of moving from polish to dicing is unnecessary, but] When exfoliating a semiconductor chip from a dicing tape, there is a possibility that a semiconductor chip may arise in breakage of a crack, a chip, etc., modification, etc. after dicing.

Then, this invention grinds a semiconductor wafer, faces it carrying out dicing of the semiconductor wafer, and manufacturing a semiconductor chip, and aims at preventing that breakage, modification, etc. arise in a semiconductor wafer and a semiconductor chip.

The indication of invention

This invention is the manufacture method of a semiconductor chip of dividing into the semiconductor chip for each circuit of every the semiconductor wafer with which the circuit was formed in the field divided by the street. The support plate unification process at which the pressure sensitive adhesive sheet with which adhesive power declines is made to intervene, the surface of a semiconductor wafer is stuck on a support plate, and the back of a semiconductor wafer is exposed by stimulus, The polish process which grinds the back of the semiconductor wafer which was united with the support plate, The dicing process which carries out dicing of the semiconductor wafer which the polish process was completed and was united with the support plate where it turned the back upwards and it is held, and divides it into a semiconductor chip, The manufacture method of the semiconductor chip which consists of partition processes which a stimulus is given to a pressure sensitive adhesive sheet, and adhesive power is reduced, and remove a semiconductor chip from a support plate is offered. And the generation-of-gas agent to which the manufacture method of this semiconductor chip generates gas by stimulus in a pressure sensitive adhesive sheet being contained, and a stimulus are ultraviolet rays, and a generation-of-gas agent sets gas to generating and a partition process by ultraviolet rays. Ultraviolet rays are irradiated only at a semiconductor chip to make it separate from a support plate, A pressure sensitive adhesive sheet makes the

generation-of-gas agent which becomes at least one or more kinds of resin chosen from acrylic, an OREFIN system, and the Pori Karbo Nate system from an azo compound contain, and is constituted, Let it be additional requirements that a support plate is constituted by the transparent or translucent quality of the material, that a support plate is constituted by glass and the thickness is 0.5mm to 2.5mm, and to form in the perimeter part of a support plate the alignment mark which shows the position of a street.

Thus, according to the manufacture method of the semiconductor chip constituted, a semiconductor wafer is stuck on a rigid high support plate through the pressure sensitive adhesive sheet to which adhesive power falls by stimulus. Since polish and dicing are performed in the state, a stimulus is given after that, adhesive power is reduced and a semiconductor chip can be taken up, [in / these processes] while always being able to support a semiconductor wafer or a semiconductor chip stably at the time of conveyance between processes It can carry out certainly and easily and breakage of a crack, a chip, etc., modification, etc. do not arise [safety and] the pickup of a semiconductor chip in a semiconductor chip.

The best form for inventing

As the best form for carrying out this invention, the back of semiconductor wafer W shown in Fig. 1 is ground, and how to cut Street S in all directions (dicing), and to manufacture each semiconductor chip C is explained.

The circuit is formed in the surface of the field divided by Street S in semiconductor wafer W shown in Fig. 1. As shown in Fig. 2, the surface of semiconductor wafer W is stuck on a support plate 13 through the pressure sensitive adhesive sheet 12, and where it turned semiconductor wafer W over and the back 10 is turned upwards, as shown in Fig. 3, it is considered as one (support plate unification process). That is, the surface 11 of semiconductor wafer W is stuck on the pressure sensitive adhesive sheet 12.

The pressure sensitive adhesive sheet 12 is a pressure sensitive adhesive sheet with which the generation-of-gas agent to which adhesive power falls is contained by having the character in which adhesive power declines, by stimulus, for example, emitting gas from the surface. As a stimulus in this case, ultraviolet rays are used, for example.

The pressure sensitive adhesive sheet 12 may be an adhesive non support tape which has the adhesive layers 14 and 15 to both sides like the pressure sensitive adhesive sheet 12a shown in Fig. 4, and may be the thing of the type which the adhesive layers 17 and 18 are formed in both sides of a base material 16 like the pressure sensitive adhesive sheet 12b shown in Fig. 5, and is constituted. Moreover, you may be the non support tape which consists of an one-layer adhesive layer 19 like the pressure sensitive adhesive sheet 12c shown in Fig. 6, [in the type using a base material 16] like the pressure sensitive adhesive sheet 12b of Fig. 5 when the adhesive layer 17 is that to which adhesive power falls by light As for a base material

16, it is [light] desirable that it is the thing which makes it penetrate or pass, and it For example, acrylics, The sheet which consists of transparent resin, such as OREFIN, polycarbonate, vinyl chloride, ABS, polyethylene terephthalate (PET), nylon, urethane, and polyimide, the sheet which has meshes-of-a-net-like structure, the sheet which the hole was able to open, etc. are mentioned.
The generation-of-gas agent which generates gas by stimulus is contained, light, heat, an ultrasonic wave, etc. are mentioned as that stimulus, and the adhesive layers 14, 17, and 19 which constitute the pressure sensitive adhesive sheets 12a, 12b, and 12c have light or desirable heat also in this. Moreover, ultraviolet rays, visible light, etc. are mentioned as a light.

Although limitation in particular is not carried out as the above-mentioned generation-of-gas agent, an azo compound and an AJIDO compound are used suitably, for example. As an azo compound, for example 2 and 2'-azobis (N-butyl 2-MECHIRUPUROPI-on amide), 2 and 2'-azobis {2-******- N-[1 and 1-bis(hydroxymethyl)-2-hydroxyethyl] PUROPI-on amide}, 2 and 2'-azobis {2-******- N-[2-(1-hydroxy butyl)] PUROPI-on amide}, 2 and 2'-azobis [2-******- N-(2-hydroxyethyl) PUROPI-on amide], 2 and 2'-azobis [N-(2-propenyl)-2-MECHIRUPUROPI-on amide], 2 and 2'-azobis (N-butyl 2-MECHIRUPUROPI-on amide), 2 and 2'-azobis (N-cyclohexyl 2-MECHIRUPUROPI-on amide), 2 and 2' azobis [-] [2-(5-******- 2-imidazoline 2-IRU) propane] dihydrochloride, 2 and 2' azobis [-] [2-(2-imidazoline 2-IRU) propane] dihydrochloride, - azobis [2-(2-imidazoline 2-IRU) propane] JISARUFEITOJI hydrate, and 2 and 2 '2, 2' azobis [-] [2-(3, 4, 5, 6-tetrahydro pyrimidine-2-yl) propane] dihydrochloride, 2 and 2'-azobis {2-[1-(2-hydroxyethyl)-2-imidazoline 2-IRU] propane} JIHAIDO chloride, 2 and 2'-azobis [2-(2-imidazoline 2-IRU) propane], 2 and 2'-azobis (2-methylpropionamidin) high draw chloride, 2 and 2'-azobis (2-amino propane) dihydrochloride, 2 2'-azobis [N-(2-cull BOKISHIASHIRU)-2-******- propionamidin, 2 and 2'-azobis {2-[N-(2-carboxyethyl) friend gin] propane}, 2, 2 '- azobis (2-MECHIRUPUROPI-on amide OKISHIMU) and JIMECHIRU 2 and 2'-azobis (2-MECHIRU propionate), - azobis (4-cyano pentanoic acid), and dimethyl-2,2'-azobisisobutyrate, 4, and 4'-azobis (4-cyano carbonic acid), 4, and 4 '2, 2'-azobis (2, 4, and 4-bird MECHIRU pen tongue) etc. is mentioned. There is a process exposed to high temperature in the manufacturing process of a semiconductor wafer. For example, since it becomes high temperature by frictional heat in the polish process which grinds the back of a semiconductor wafer, - azobis (N-butyl 2-MECHIRUPUROPI-on amide), and 2 with high thermal decomposition temperature, 2'-azobis (N-butyl 2-MECHIRUPUROPI-on amide), 2, and 2 '2, 2'-azobis (N-cyclohexyl 2-MECHIRUPUROPI-on amide) is suitable also in these. These azo compounds generate nitrogen gas by the stimulus by light, heat, etc.
As an AJIDO compound, for example Moreover, 3-azidomethyl 3-MECHIRU oxetane, The polymer which has azido groups, such as glycidyl AJIDO polymer obtained by carrying out ring

opening polymerization of the phthalazide and p-tert-butyl BENZUAJIDO;3-azidomethyl 3-MECHIRU oxetane, is mentioned. These AJIDO compounds generate nitrogen gas by the stimulus by light, heat, a shock, etc.

Among these generation-of-gas agents, since it decomposes easily and an AJIDO compound emits nitrogen gas also by giving a shock, it has the problem that handling is difficult. Furthermore, an AJIDO compound also has the problem that a semiconductor wafer may be damaged with the nitrogen gas generated explosively from a chain reaction being caused, nitrogen gas being emitted explosively, and the control not being performed once decomposition starts. The amount of the AJIDO compound used is limited from this problem. On the other hand, since an azo compound does not generate gas depending on a shock unlike an AJIDO compound, it is very easy handling. Moreover, if irradiation of light is interrupted without damaging a semiconductor wafer, since a chain reaction is caused, gas is not generated explosively and gaseous generating can also be interrupted, there is also an advantage that the adhesive control united with the use is possible. Therefore, as a generation-of-gas agent, it is desirable to use an azo compound.

By making the adhesive layers 14, 17, and 19 contain the above generation-of-gas agents, if a stimulus is given to the adhesive layers 14, 17, and 19, gas can occur from a generation-of-gas agent, adhesive power can decline, and a semiconductor chip can be exfoliated easily behind.

Although the generation-of-gas agent may be distributed by the adhesive layers 14, 17, and 19, since the whole adhesive layer serves as a foaming object in that case, it becomes soft too much, and there is a possibility that it may become impossible to remove an adhesive layer well. Therefore, it is desirable to make only the surface portion which touches semiconductor wafer W contain. If the surface portion is made to contain, the adhesion area of a pressure sensitive adhesive sheet and a semiconductor chip decreases by the gas which occurred from the generation-of-gas agent, and moreover, gas will remove a part of adhesive face [at least] of an adhesive layer from a semiconductor chip, and will reduce adhesive strength.

As a method of making only the surface portion of the adhesive layers 14, 17, and 19 containing a generation-of-gas agent For example, the method of coating the adhesive which contains a generation-of-gas agent by a thickness of about 1-20 micrometers on an adhesive layer, The method of making a generation-of-gas agent adhere to the adhesive layer surface uniformly etc. is mentioned by applying the volatile fluid containing a generation-of-gas agent to the surface of the adhesive layers 14, 17, and 19 produced beforehand, or spraying with a spray etc.

When making a generation-of-gas agent adhere to the adhesive layer surface, it is desirable to make an adhesive and the generation-of-gas agent excellent in compatibility adhere. That is, if a generation-of-gas agent is made to adhere to the adhesive surface so much, adhesive power

will decline, but since the adhering generation-of-gas agent is absorbed by the adhesive when dissolving an adhesive and a generation-of-gas agent, adhesive power does not decline.
In addition, although the thickness of a surface portion is based on the thickness of an adhesive layer, it is desirable that it is a portion from the adhesive surface to 20 micrometers. Moreover, the mode in which the generation-of-gas agent adhering to the mode in which the generation-of-gas agent has adhered to the adhesive surface uniformly, or the adhesive surface dissolved with the adhesive, and was absorbed by the adhesive layer is included in the surface portion said here.
As for the adhesive which constitutes the adhesive layers 14, 17, and 19, it is desirable that it is that in which an elastic modulus rises by stimulus. In this case, the stimulus which raises an elastic modulus may be the same as that of the stimulus for generating gas from a generation-of-gas agent, and may differ. The polymerization nature polymer of the acrylic acid ARUKIRU ester system which has unsaturated bonding of radical polymerization nature in a molecule as this adhesive, for example, and/or an alkyl methacrylate ester system, The optical hardening type adhesive which uses the polyfunctional oligomer or the monomer of radical polymerization nature as the main ingredients, and contains a photo polymerization initiator if needed, The polymerization nature polymer of the acrylic acid ARUKIRU ester system which has unsaturated bonding of radical polymerization nature in a molecule, and/or an alkyl methacrylate ester system, The polyfunctional oligomer or the monomer of radical polymerization nature is used as the main ingredients, and what consists of a heat hardening type adhesive containing a thermal polymerization initiator is mentioned.
Since the whole adhesive layer carries out polymerization bridge construction uniformly and promptly with irradiation or heating of light and hardened type adhesives, such as such an optical hardening type adhesive or a heat hardening type adhesive, unify, the rise of the elastic modulus by polymerization hardening becomes remarkable, and adhesive power declines greatly. Moreover, if gas is generated from a generation-of-gas agent in a hard hardened material, the great portion of generated gas is emitted outside, and the emitted gas will remove a part of adhesion side [at least] of a semiconductor chip and an adhesive layer, and will reduce adhesive strength.
The acrylic (meta) polymer to which the above-mentioned polymerization nature polymer had a functional group in the molecule, for example It can compound beforehand (it is hereafter called functional group content (meta) acrylic polymer), and can obtain by making it react with the compound (following and functional group content unsaturated compound) which has the above-mentioned functional group, the functional group which reacts, and unsaturated bonding of radical polymerization nature in a molecule. In addition, in this Description, acrylics (meta) shall mean acrylics or methacrylic one.
[the above-mentioned functional group content (meta) acrylic polymer] Like the case of

general (meta) acrylic polymer as polymer which has adhesiveness in normal temperature The carbon number of an alkyl group makes the main monomer the acrylic acid ARUKIRU ester and/or alkyl methacrylate ester which are usually in the range of 2-18, and them This and a functional group content monomer, Furthermore, it is obtained by carrying out the copolymerization of these and other copolymerizable monomers for reforming by a usual state method if needed. The weight average molecular weight of the above-mentioned functional group content (meta) acrylic polymer is usually 200,000 to about 2 million.

As a functional group content monomer, for example Carboxyl group content monomer; acrylic acid hydroxyethyl, such as acrylic acid and methacrylic acid, Hydronalium KISHIRU machine content monomers, such as methacrylic acid hydroxyethyl; Metaglycidyl acrylate, Epoxy group content monomers, such as glycidyl methacrylate; amino group content monomers, such as isocyanate group content monomer; acrylic acid aminoethyl, such as acrylic acid iso cyanate ethyl and methacrylic acid iso cyanate ethyl, and methacrylic acid aminoethyl, etc. are mentioned.

the above -- as other copolymerizable monomers for reforming, various kinds of monomers used for general (meta) acrylic polymer, such as acetic acid vinyl polymers, acrylonitrile, and styrene, for example are mentioned.

The same thing as the functional group content monomer mentioned above according to the functional group of functional group content (meta) acrylics polymer as a functional group content unsaturated compound made to react to the above-mentioned functional group content (meta) acrylic polymer can be used. For example, when the functional group of functional group content (meta) acrylic polymer is a carboxyl group, an epoxy group content monomer and an isocyanate group content monomer are used. When this functional group is a hydronalium KISHIRU machine, an isocyanate group content monomer is used, when this functional group is an epoxy group, amide machine content monomers, such as a carboxyl group content monomer and acryl amide, are used, and when this functional group is an amino group, an epoxy group content monomer is used.

As the above-mentioned polyfunctional oligomer or a monomer That whose molecular weight is 10,000 or less is desirable, and the molecular weight is 5000 or less, and the number of the minimums of the number of unsaturated bonding of the radical polymerization nature in the molecule is two, and that of maximums is 20 so that heating or three-dimensions reticulated-ization of the adhesive layer by irradiation of light may be made efficiently more preferably. As such more desirable polyfunctional oligomer or a monomer For example, trimethylolpropane triacrylate, TETORAMECHI roll methane tetraacrylate, PENTA erythritol bird acrylate, PENTA erythritol tetraacrylate, Dipentaerythritolmonohydroxypentaacrylate, dipentaerythritol hexaacrylate, 1, 4-butylene glycol diacrylate, 1, 6-hexanediol diacrylate, Pori ethylene glycol diacrylate, commercial oligoester acrylate, or the same methacrylate as the above is

mentioned. These polyfunctional oligomers or monomers may be used independently, and two or more sorts may be used together.

It is mentioned by what is activated by irradiating light with a wavelength of 250-800nm as the above-mentioned photo polymerization initiator, for example, and as such a photo polymerization initiator For example, the aceto FENON dielectric compounds, such as METOKISHIASETOFENON; BenzoIMPURO pill ether, Benzoin ether system compounds, such as benzoin isobutyl ether; BenzoRUJIMECHIRUKE tar, KETARU dielectric compound [, such as aceto FENONJIECHIRUKETARU,]; -- phosphine OKISHIDO dielectric compound; -- a bis(eta5-cyclopentadienyl) titanocene dielectric compound -- Optical radical polymerization initiators, such as benzoFENON, Michler's ketone, a chloro thioxan ton, a TODESHIRU thioxan ton, a JIMECHIRU thioxan ton, a JIECHIRU thioxan ton, alpha-hydroxy cyclohexyl phenyl ketone, and 2-hydroxymethyl phenyl propane, are mentioned. These photo polymerization initiators may be used independently and two or more sorts may be used together.

As the above-mentioned thermal polymerization initiator, heat decomposes, and what generates activity RAJIKARU which starts polymerization hardening is mentioned, and specifically for example Dicumyl peroxide, G t-butyl peroxide, tert-butyl peroxide benzoate, t-butyl hydroperoxide, benzoyl peroxide, KUMEN hydroperoxide, diisopropylbenzene hydroperoxide, paramenthane hydroperoxide, G t-butyl peroxide, etc. are mentioned. Especially, since thermal decomposition temperature is high, KUMEN hydroperoxide, paramenthane hydroperoxide, G t-butyl peroxide, etc. are suitable. Although not limited especially as what is marketed among these thermal polymerization initiators, par butyl D, par butyl H, par butyl P, the par mentor H (all are the Nippon Oil & Fats make above), etc. are suitable, for example. These thermal polymerization initiators may be used independently and two or more sorts may be used together.

You may blend suitably with the above-mentioned hardened type adhesive various kinds of polyfunctional compounds blended with common adhesives, such as an iso cyanate compound, a melamine compound, and an epoxy compound, by request in order to aim at regulation of the cohesive force as an adhesive besides the above component. Moreover, you may blend well-known additives, such as reversibility, resin, a surfactant, wax, and a particulate bulking agent.

[the adhesive which constitutes the adhesive layer 15 shown in Fig. 4, and the adhesive layer 18 shown in Fig. 5] [as shown in Fig. 2, it is not necessary to adhere to a substrate 13 and to necessarily have the character in which adhesive power declines by stimulus, and] as it explained [above-mentioned] when it is necessary to make the pressure sensitive adhesive sheet 12 exfoliate from a substrate 13 It is desirable to be constituted by the adhesive of the type to which adhesive power falls by a certain stimulus.

It is constituted by hard members, such as glass, metal, and hard resin, the support plate 13 shown in Fig. 2 has high rigidity, and it can be supported stably, without making stuck semiconductor wafer W produce bending. For example, sufficient rigidity can be acquired if the thickness is 0.5mm - about 2.5mm in the case of glass. Moreover, light can be made to penetrate, if a transparent or translucent member constitutes a support plate 13 when the stimulus explained [above-mentioned] is light. In addition, the thing smooth so that a plane may be obtained at the time of grinding processing of the glass surface is desirable.

It is stuck through the pressure sensitive adhesive sheet 12, and the back is ground using the polish equipment 20 which shows semiconductor wafer W which was united with the support plate 13, for example in Fig. 7.

In polish equipment 20, from the end of the pedestal 21, a wall 22 stands up and is prepared. A pair of rails 23 are perpendicularly arranged in the field inside this wall 22, and it is constituted so that the polish means 25 attached to the supporter 24 in connection with a supporter 24 sliding and moving up and down along with a rail 23 may move up and down. Moreover, a turntable 26 is arranged by the pedestal 21 pivotable and two or more chuck tables 27 holding a semiconductor wafer are further arranged in it by the turntable 26 pivotable.

In the polish means 25, it is equipped with a mounter 29 at the tip of the spindle 28 which has a vertical axial center. Furthermore, the lower part is equipped with the polish wheel 30, the polish whetstone 31 adheres to the lower part of the polish wheel 30, and it has composition which the polish whetstone 31 rotates with rotation of a spindle 28.

When grinding semiconductor wafer W using polish equipment 20, place a support plate 13 upside down, and semiconductor wafer W which was united with the support plate 13 is made to hold to a chuck table 27, and is positioned directly under the polish means 25. That is, the back 10 of semiconductor wafer W is confronted with the polish whetstone 31.

And if the polish means 25 is dropped while rotating a spindle 28, while the polish wheel 30 will rotate with rotation of a spindle 28 By the rotating polish whetstone 31 contacting semiconductor wafer W, and applying thrust, the back 10 is ground by the polish whetstone 31 and serves as desired thickness (polish process).

Next, dicing of the semiconductor wafer W which the polish process was completed and was formed in desired thickness is carried out using the dicing equipment 40 shown, for example in Fig. 8.

While semiconductor wafer W after termination of a polish process had been united with the support plate 13 to this dicing equipment 40, it is conveyed in the state where the back 10 of semiconductor wafer W was turned up, and more than one are accommodated in a cassette 41.

[semiconductor wafer W which was united with the support plate 13] After it was taken out by

the taking-out acquisition stage 42 from the cassette 41 and being laid in the temporary placing field 43, The first conveyance means 44 is adsorbed and it is conveyed by the chuck table 45 by the slewing motion, and suction holding of the support plate 13 is laid and carried out in the state where it turned down (after the back of semiconductor wafer W has turned to the top).
Next, when the chuck table 45 holding semiconductor wafer W moves in the direction of +X, it is positioned directly under the alignment means 46. While the alignment means 46 is equipped with the infrared camera 47 which is made to penetrate light from the back 10 of semiconductor wafer W, and can detect a surface street etc. and the alignment means 46 moves to Y axial direction The back 10 of semiconductor wafer W supported by the support plate 13 is made to penetrate with the infrared camera 47, the surface is picturized, and the street which should be cut by performing pattern matching processing with the key pattern picture beforehand memorized by the memory etc. and the picturized picture is detected.
The cutting means 49 equipped with the rotary blade 48 is formed in the alignment means 46 and one. Moreover, the rotary blade 48 has the infrared camera 47 and equal Y coordinates. That is, both are located on a straight line in X axial direction.
Therefore, if a street is detected by the alignment means 46, position ****** of Y axial direction of the street and rotary blade 48 will be made automatically. And while the chuck table 45 holding semiconductor wafer W supported by the support plate 13 moves in the direction of +X further and the rotary blade 48 carries out a high velocity revolution, the street concerned is cut by the cutting means' 49 descending and cutting deeply from the back 10 side on the detected street.
And if it carries out deducing, sending and making the cutting means 49 into a street gap [every] Y axial direction while making X axial direction carry out reciprocation moving of the chuck table 45, as shown in Fig. 9, all the streets of this direction will be cut.
Furthermore, since a chuck table 45 is rotated 90 degrees, if it cuts like the above, as shown in Fig. 10, dicing of all the streets will be cut and carried out, and they will be divided into each semiconductor chip (dicing process).
In this way, even after dicing is carried out, since each semiconductor chip C is in the state [being stuck on a support plate 13], it needs to exfoliate and take up semiconductor chip C from a support plate 13.
Since it is united with the pressure sensitive adhesive sheet 12 shown with much semiconductor chip C and a support plate 13 in Fig. 2, it changes into the state of reducing the adhesive power of the pressure sensitive adhesive sheet 12, and being easy to exfoliate semiconductor chip C, by giving a stimulus to the pressure sensitive adhesive sheet 12.
for example, when the generation-of-gas agent which generates gas by ultraviolet rays is contained in the pressure sensitive adhesive sheet 12 Since gas occurs between semiconductor chip C by irradiating ultraviolet rays from the irradiation part 50 of the lower part

of a support plate 13, and generating gas as shown in Fig. 11, adhesive power can be reduced.

Although it is also possible at this time to irradiate ultraviolet rays at once at the whole pressure sensitive adhesive sheet 12 Since a possibility that semiconductor chip C may break away and fall is before being taken up when the whole adhesive power declines, as shown in Fig. 11, it is desirable to make it irradiate ultraviolet rays only at a semiconductor chip just before being taken up. And it can be made to dissociate from a support plate 13 easily about the semiconductor chip currently stuck on the portion to which adhesive power fell (partition process).

Moreover, ultraviolet rays are irradiated at the pressure sensitive adhesive sheet 12 whole, and adhesive power is reduced to some extent and you may make it irradiate ultraviolet rays at a portion to make it separate further, just before making it dissociate. It may heat partially and you may dissociate for every piece of **.

If the division method of the semiconductor wafer explained above is illustrated according to a process, it will become like Fig. 12 (A) - (D). First, in the support plate unification process shown in (A), semiconductor wafer W is stuck so that the back 10 may become a top to a support plate 13, and it is held in the state at the chuck table 27 of polish equipment, and the back is ground by the polish whetstone 31 in the polish process shown in (B).

And semiconductor wafer W is held at the chuck table 45 of dicing equipment in the state [being stuck on a support plate 13 in the dicing process shown in (C)], and dicing of the semiconductor wafer W is carried out. Finally, each semiconductor chip formed of dicing is taken up in the partition process shown in (D), and is removed from a support plate 13.

Thus, since manufactured semiconductor chip C is supported by the rigid high support plate 13 also in any at the time of conveyance to dicing from polish at the time of dicing at the time of polish, it breaks in each process and a chip, modification, etc. do not produce it. Therefore, the quality of the semiconductor chip finally manufactured is high, and yield's improves.

A quality semiconductor chip can be manufactured without carrying out breakage etc. especially, when it is the semiconductor wafer which carries out breakage, modification, etc. in process of manufacture in many cases, if it is usual [with thickness following 50 micrometers].

In addition, in the above-mentioned form although aligned using infrared rays in dicing equipment 40 If a support plate 51 is formed more greatly than semiconductor wafer W and the alignment mark 53 which shows the position of a street beforehand is formed in the exposed perimeter part 52, as shown in Fig. 13 Even if it does not use an infrared camera, it can align by detecting the street which should be cut by picturizing the alignment mark 53 by the usual image pick-up.

Industrial availability

As mentioned above, according to the manufacture method of the semiconductor chip concerning this invention, a semiconductor wafer is stuck on a rigid high support plate through the pressure sensitive adhesive sheet to which adhesive power falls by stimulus. Since polish and dicing are performed in the state, a stimulus is given after that, adhesive power is reduced and a semiconductor chip can be taken up, while always being able to support a semiconductor wafer or a semiconductor chip stably in these processes at the time of conveyance between processes -- the pickup of a semiconductor chip -- safety -- it can carry out certainly and easily. Therefore, there are not breakage of a crack, a chip, etc., modification, etc. and it is useful to manufacture of the high semiconductor chip of high quality and the yield. Also when manufacturing the very thin semiconductor chips with thickness following 50 micrometers especially, in the point which can do the same effect so, it is very useful.

[Brief Description of the Drawings]

Fig. 1 is a perspective view showing the semiconductor wafer with which this invention is applied,

Fig. 2 is a perspective view showing the support plate unification process which constitutes this invention,

Fig. 3 is a perspective view showing the state where the semiconductor wafer and this support plate were united,

Fig. 4 is a sectional view expanding and showing a part of first example of a pressure sensitive adhesive sheet,

Fig. 5 is a sectional view expanding and showing a part of second example of a pressure sensitive adhesive sheet,

Fig. 6 is a sectional view expanding and showing a part of third example of a pressure sensitive adhesive sheet,

Fig. 7 is a perspective view showing an example of the polish equipment used for operation of the polish process which constitutes this invention,

Fig. 8 is a perspective view showing an example of the dicing equipment used for operation of the dicing process which constitutes this invention,

Fig. 9 is a perspective view showing the state where all the streets of one way were cut in the dicing process,

Fig. 10 is a perspective view showing the state where the street was cut in all directions by the dicing process,

Fig. 11 is a perspective view showing the partition process which constitutes this invention,

Fig. 12 is an explanatory view showing this invention according to a process,

Fig. 13 is a perspective view showing the second example of a support plate,

Fig. 14 is a top view showing a semiconductor wafer.

[Brief Description of the Drawings]

Fig. 1 is a perspective view showing the semiconductor wafer with which this invention is applied,

Fig. 2 is a perspective view showing the support plate unification process which constitutes this invention,

Fig. 3 is a perspective view showing the state where the semiconductor wafer and this support plate were united,

Fig. 4 is a sectional view expanding and showing a part of first example of a pressure sensitive adhesive sheet,

Fig. 5 is a sectional view expanding and showing a part of second example of a pressure sensitive adhesive sheet,

Fig. 6 is a sectional view expanding and showing a part of third example of a pressure sensitive adhesive sheet,

Fig. 7 is a perspective view showing an example of the polish equipment used for operation of the polish process which constitutes this invention,

Fig. 8 is a perspective view showing an example of the dicing equipment used for operation of the dicing process which constitutes this invention,

Fig. 9 is a perspective view showing the state where all the streets of one way were cut in the dicing process,

Fig. 10 is a perspective view showing the state where the street was cut in all directions by the dicing process,

Fig. 11 is a perspective view showing the partition process which constitutes this invention,

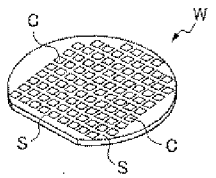
Fig. 12 is an explanatory view showing this invention according to a process,

Fig. 13 is a perspective view showing the second example of a support plate,

Fig. 14 is a top view showing a semiconductor wafer.

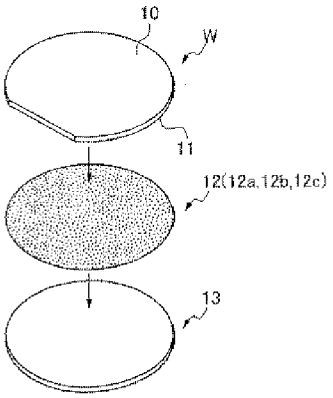
[Drawing 1]

第 1 図



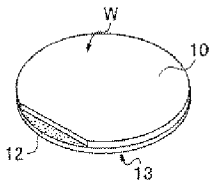
[Drawing 2]

第 2 図



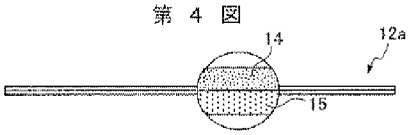
[Drawing 3]

第 3 図



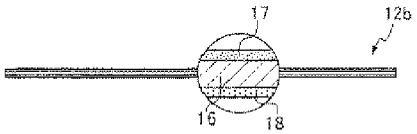
[Drawing 4]

第 4 図



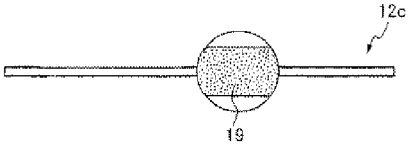
[Drawing 5]

第 5 図



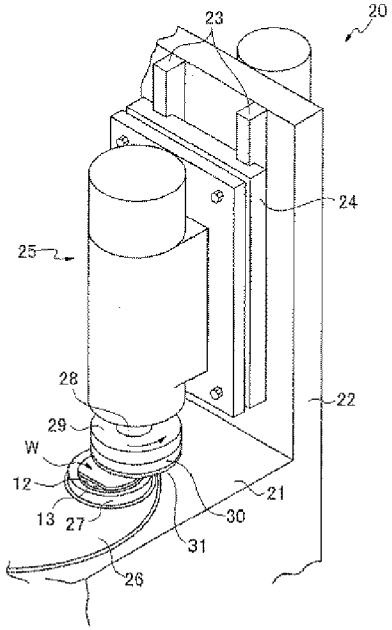
[Drawing 6]

第 6 図



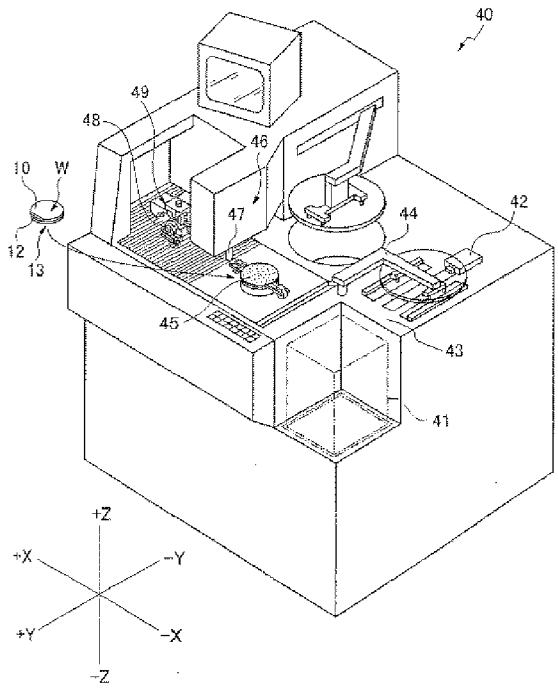
[Drawing 7]

第 7 図



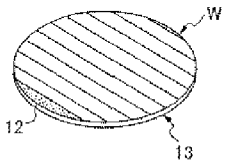
[Drawing 8]

第 8 図



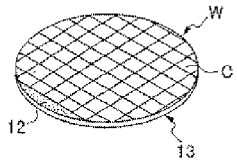
[Drawing 9]

第 9 図



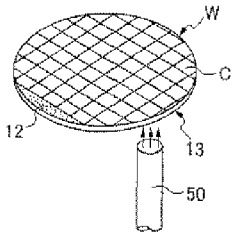
[Drawing 10]

第 10 図



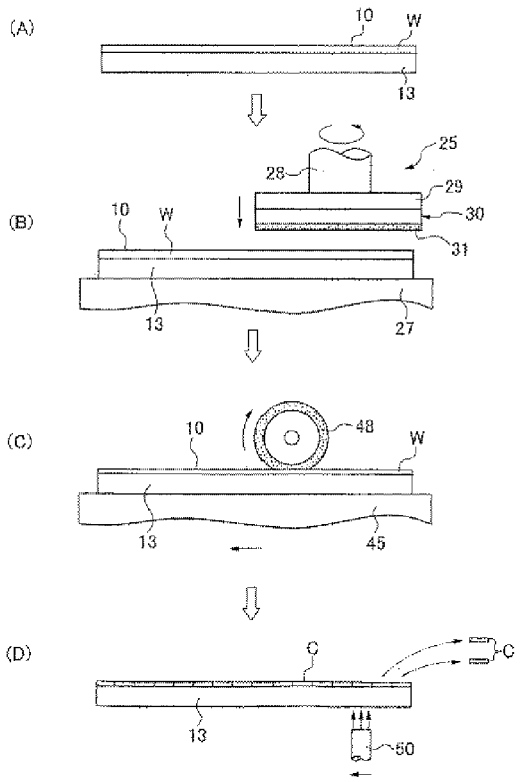
[Drawing 11]

第 11 図



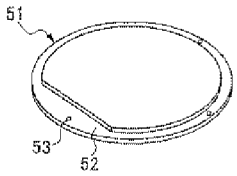
[Drawing 12]

第 12 図



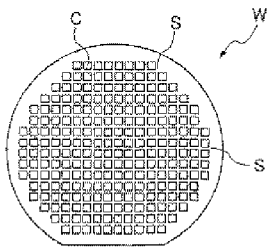
[Drawing 13]

第 13 図



[Drawing 14]

第 14 図



[Translation done.]